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Early Predictors of Daily Smoking in Young Women: The National Heart, Lung, and Blood Institute Growth and Health Study[1]

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Background. **Smoking is highly prevalent in young women and little is known about early multilevel independent risk or protective factors that are predictive of daily smoking in young women.**

Methods. **Multiple logistic regression was conducted on data from NGHS, a 10-year cohort study of Black (1,213) and White (1,166) girls recruited from three clinical centers in the United States, ages 9–10 years on entry to ages 18–19.**

Results. **Compared with never smokers, White girls were at higher risk than Black girls of being daily smokers at ages 18–19. Early predictors of daily smoking at ages 18–19 years included lower parental education, one parent in the household, drinking alcohol at ages 11–12, higher drive for thinness at ages 11–12, lower behavioral conduct at ages 11–12, and lower stress at ages 10–11 and higher stress at ages 12–13. For both Black and White girls weight-related variables were significant. Stress, behavioral conduct, and one-parent household were also important predictors for White girls.**

Conclusions. **There is evidence that childhood and adolescent factors are related to young adult smoking behavior. Body weight concerns as well as family, social environment, and behavioral factors are important issues in determining which girls will become daily smokers.**

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INTRODUCTION

More than 3,000 youths initiate smoking each day [*1*] and it is estimated that more than five million of today's young smokers will die of tobacco-related illnesses [*2*]. Despite extensive public health efforts there has been little reduction in the prevalence of adolescent smoking. The prevalence of adolescent smoking is increasing in both boys and girls and increasing more in Whites than Blacks [*3*]. Recent data on long-term trends in daily smoking show that high school seniors were smoking at higher rates in 1998 than in 1992. Male and female seniors reported similar levels (23 and 22%) of daily smoking in 1998 [*4*]. A report from the 1999 Youth Risk Behavior Survey shows White female high school students smoking at the highest rate (39.1%) of all subgroups including White males and Black and Hispanic males and females. The largest increase in current smoking between 1997 (39.6%) and 1999 (42.8%) has been in 12th-graders. Frequent smoking among high school students has increased significantly between 1991 and 1999, with White students more likely than Black and Hispanic students to report this behavior [*5*]. Cigarette use is increasing as well on college campuses nationwide in all subgroups of students and types of colleges. Substantial numbers of college students are starting to smoke regularly and trying to stop. While smoking prevalence has increased substantially in male and female college students (23.4 and 31.0%) between 1993 and 1997, the increase in incidence has been greater for females [*6*].

Nationwide, 30% of all adolescents who experiment with smoking will progress to daily smoking [*7*]. However, Blacks are less likely to progress to being regular smokers (Blacks: 10.3%, Whites: 25.7%) [*8*]. In our study investigating transitions between experimental

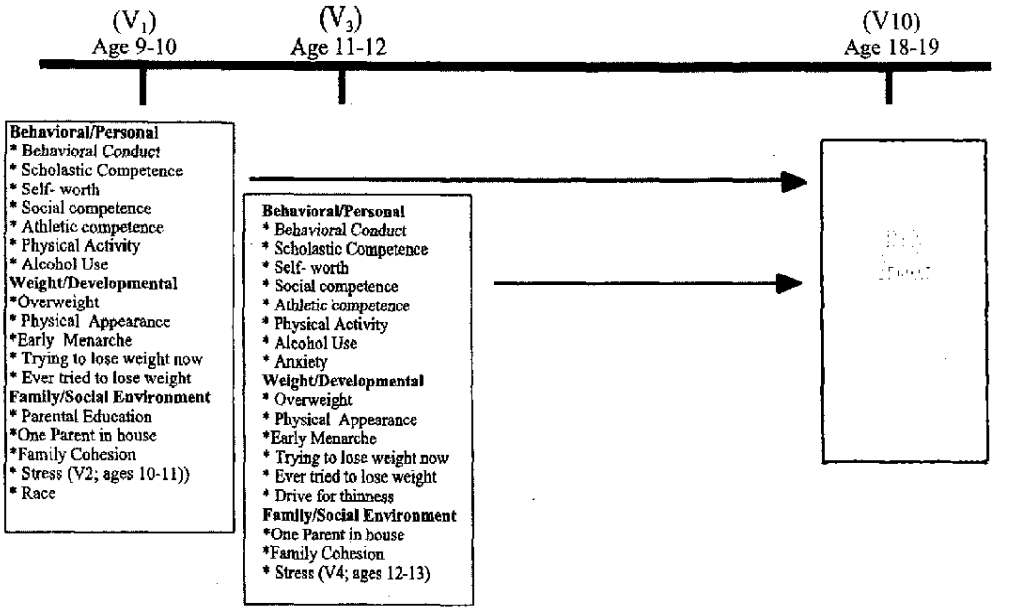

FIG. 1. Childhood and early adolescent potential predictors of daily smoking in young women in NGHS.

and regular smoking in Black and White girls over the teenage period, we found that early regular smoking was very stable, with the majority of 14-year-olds maintaining their habits into young adulthood. There were significant differences between White and Black girls, with Blacks being less likely to smoke at any level and having lower probabilities of progressing from earlier stages [*9*]. Therefore understanding early characteristics of those individuals who make the critical transition to daily use, a step generally taken during adolescence, could lead to the development of more effective prevention programs.

A variety of psychosocial risk factors have been studied previously including sociodemographic, environmental, behavioral, and personal factors. In a review of 27 prospective studies of smoking onset supportive findings outweighed nonsupportive findings in the areas of socioeconomic status, and family and peer factors, as well as behavioral and personal factors [*10,11*]. The recent Report of the Surgeon General focusing on tobacco use in U.S. minority groups has reviewed various studies investigating psychosocial determinants in minority groups [*12*]. They concluded that certain categories of variables such as sociodemographic, environmental, behavioral, personal, and psychological factors may be related to tobacco use among youths of various racial/ethnic groups. Evidence suggests that early maturation is associated with smoking initiation in girls [*13*]. Control of weight may also lead adolescent girls to begin smoking [*14*]. A few studies have shown body weight concerns in girls related to smoking status [*15–17*], but only one study differentiated by smoking level (experimental and regular) [*18*]. Lower parental education has been shown to be associated with higher levels of adolescent substance use, lower protective factors, and higher levels of risk factors. The effect of higher parental education on adolescent substance use may be mediated through parental support, academic competence, behavioral competence, negative life events, and peer substance use [*19*].

It is not clear how early factors may contribute to later smoking status and which factors may pertain particularly to girls. We considered the multiple influences of adolescent girls and considered multilevel factors (personal, behavioral, and social/family environment) available to us that have been suggested to influence smoking and other health behaviors and may be particularly salient for girls. To our knowledge, no study has taken a comprehensive look at regular smoking in a biracial cohort of young women to investigate early antecedents of multiple-level risk factors. The current study sought to understand what early factors (prior to the initiation of smoking) place girls at increased risk for becoming daily smokers as young adults. Figure one lists the early predictor variables used in the analyses.

METHODS

Participants

National Heart, Lung and Blood Institute Growth and Health Study (NGHS) is a longitudinal study that enrolled a cohort of 2,379 girls (1,213 Black and 1,166 White, by self-report) ages 9 and 10 in 1987–1988.

Girls were eligible if parents or guardians provided informed consent, reported they were the same race as the girl, and completed a household demographic form. Girls were enrolled in the study through school or HMO clinics in Richmond, California, Cincinnati, Ohio, and metropolitan Washington, D.C., and were followed annually for 10 years with 89% retention at year 10.

Procedures

The detailed NGHS study design, methods, interviewing techniques, and physical examination procedures of girls and their parents or guardians were described in a previous article [*12*]. Baseline assessment of participants consisted of anthropometric measurements, demographics, blood lipids, blood pressure, dietary intake, physical activity, and in-depth interviews on specific subject areas. Parents and guardians provided their own data on parental education at the baseline visit. Most measures were repeated annually. The Harter Self-Perception Profile for Children (SPPC), including items/scales on global self-worth, behavioral conduct, physical appearance, scholastic competence, social acceptance, and athletic competence, was administered at visits 1 and 3, anxiety scale at visit 3, and perceived stress at visits 2 and 4. Harter (SPPC) and the drive for thinness (DFT) scales were analyzed as continuous variables. Only the measurements used in this article are presented here (see Fig. 1 for instrument administration intervals).

Smoking Status

Smoking status was defined as reported days of smoking in 30 days previous to the annual exam at visit 10. Participants were categorized as never (no smoking in past 30 days), experimental (5 or less days in the past 30 days), occasional (6–19 days), regular (20–29), and daily (30 days). The smoking categorizations are consistent with nationally reported data [*12*].

Behavioral/Personal Factors

The Harter Self-Perception Profile for Children [*20*] was used to measure adolescent's feelings of self-worth and related feelings of competence, and acceptance in five specific domains: physical appearance, social acceptance, scholastic and athletic competence, and behavioral conduct. Scores for each question range from (1) low competence, acceptance or self-worth to (4) high competence, acceptance or self-worth (e.g., lower scores of behavioral conduct reflect poorer conduct). The psychometric properties of this scale have been evaluated from visit 1 and 3 data in this cohort and showed higher internal consistency for White girls; however, factor structure and internal consistency improved for Black girls in year 3 [*21*].

The girls perception of her general frequency of physical activity was derived from her response to the item "I am physically active" with three response options: never/almost never, sometimes, usually/always.

Alcohol use was measured with girl's response to the question, "During the past 30 days, how many days did you have at least one drink (not including religious ceremonies)." Responses were categorized dichotomously as never/none and one or more.

Anxiety was measured at visit 3 with the Revised Childrens' Manifest Anxiety Scale [*22*]. The score is derived by summing the positive responses to 28 questions from the three subscales of the instrument (psychological anxiety, worry/oversensitivity, and social concerns/concentration.)

Weight/Developmental Factors

Measurements of body size were taken annually by centrally trained and certified NGHS health examiners according to a common protocol. Height and weight were measured twice at each annual exam and repeated a third time if the first two measures varied by more than 0.5 cm for height and 0.3 kg for weight. The average of the closest two measurements was used in data analysis. Body mass index (BMI) (kg/m^2) was calculated based on weight divided by height squared. Cutpoints for obesity are based on national cutpoints defined as the 85th percentile of BMI for age and sex based on the combined distribution of both White and Black participants [*23*].

Early menarche was assessed by reported age of menarce, based on race-specific cut points (20th percentile): Early onset for Whites was age less than 11.7 years, and for Blacks, less than 11.1 years.

Trying to lose weight now and trying to lose weight ever was based on girls reported yes/no responses to the items. "I am trying to lose weight now" and "I have ever tried to lose weight." Data were available for these items from visits one and three.

Drive for thinness (DFT), a subscale of the Eating Disorders Inventory (EDI) [*24*] adapted for children consisted of a seven-item, six-response instrument designed to measure the level of preoccupation with weight and the pursuit of thinness. Reference data on the EDI in this population has been presented elsewhere [*25*]. Scores for the subscale range from 0 to 21 only the three most extreme responses were scored.

Family/Social Environment Factors

Parent-reported variables included parental education and number of parents in household. Education of parents was categorized into three groups: high school graduate or less, ≤3 years of college, and 4 or more years of college. Number of parents in household was categorized as 1 or 2 based on parental or guardian report.

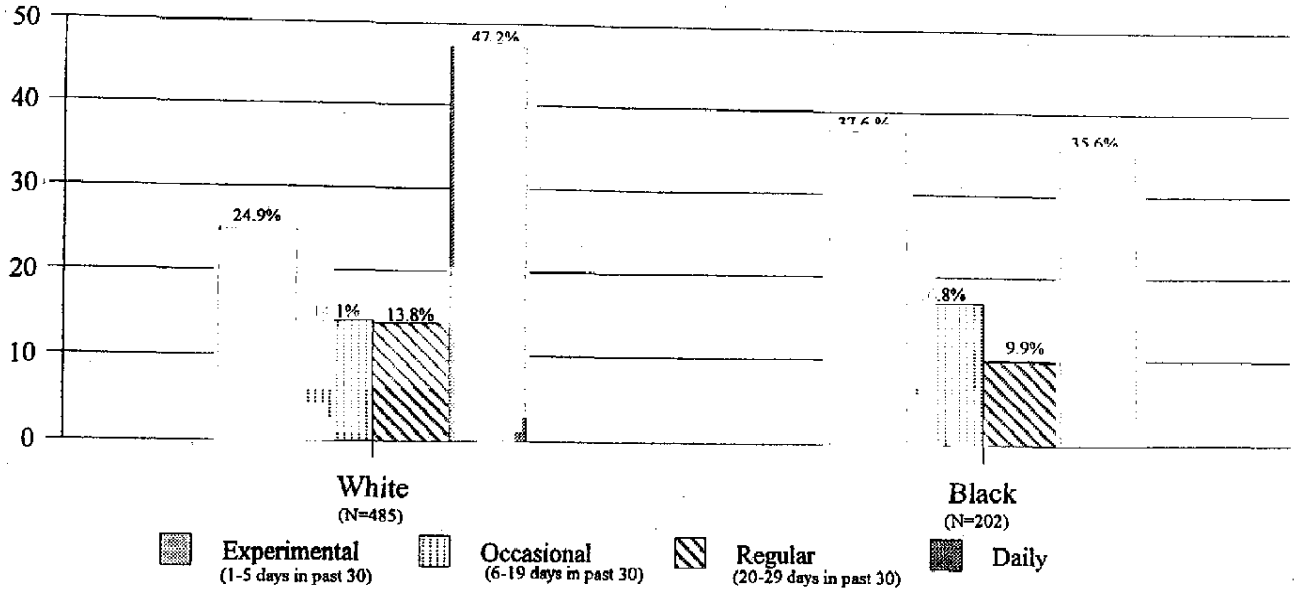

FIG. 2. Smoking level (among smokers) by race in NGHS young women ages 18–19.

Family cohesion is an adaptation of the 20-item Family Adaptability and Cohesion Evaluation Scales (FACES) [26]. NGHS used 9 items from the cohesion component, which is defined by the authors as the degree of commitment, help, and support that family members provide for one another. Scores range from 9 to 36.

Perceived stress was based on a well-established 14-item scale [27] with responses on individual items ranging from 0 to 4. The total raw scores ranged from 0 to 56 (low to high stress). This scale was administered on alternate years (visits 2 and 4).

Analytic Procedures

Significance tests for independent variable comparisons were either t tests for continuous variables or the chi-square test statistic for dichotomous variables.

The objective of the multivariate analyses was to determine the independent factors in visits 1 and 3 (prior to the initiation of smoking) that predict daily smoking 8 to 10 years later when the girls were 18–19 years old. Daily smoking versus no smoking was used as the dependent variable because both categories were considered highly accurate compared to the other categories and consistent with the research question examining high levels (daily) of smoking. Other smoking categories (Fig. 2) were excluded from the regression analyses. Logistic regression analysis was chosen for the multivariate analyses based on the dichotomous nature of the dependent variable (daily smoking versus no smoking in the past 30 days at visit 10). The regression model was constructed based on hypothesized relationships between the independent and dependent variables. The process for arriving at the final models was as follows: first-year independent variables were included in the model per Fig. 1. The year 3 variables were added to the significant year 1 variables and the process was repeated until only significant variables remained. Significance levels for retaining variables for subsequent models were set at $P = 0.05$. Analyses were conducted to determine whether there were any interactions between race and independent variables and daily smoking status. Interactions were tested on independent variables that were found significant in the final regression models. Additional race-specific models were run to determine if different variables would be related to smoking for Black and White girls. Additionally, race interactions may not be detected due to the substantially lower smoking rates in Black compared to White girls, resulting in low power. Race-specific models followed the same process of analyses as the combined model using variables from Table 1. Due to moderate correlations ($r = 0.4$–0.6) among dieting variables and the concern that entering all three in the model would lead to multicollinearity problems we entered each separately into the model to determine which would be included in the final model. The fit of the logistic regression models was assessed using the Hosmer-Lemeshow goodness-of-fit test [28]. Analyses were performed using SAS Version 6.12 [29].

RESULTS

Overall, any smoking in past 30 days for Black girls (9.8%) was lower than any smoking in White girls

(23.5%). As shown in Fig. 2, among smokers, a greater percentage of Blacks compared to Whites engaged in experimental and occasional. Regular and daily smoking was higher among Whites (13.8 and 47.2%) compared to Blacks (9.9 and 35.6% respectively). Daily smoking at ages 18–19 was higher in Whites (30.7 and 7.7%) and never smoking was higher in Blacks (92.3 and 69.4%).

In the unadjusted analyses, daily smokers were compared to never smokers, those who did not smoke in the past 30 days (Table 1). Lower parental education was associated with daily smoking in White girls, with the same trend in Black girls. Also associated with daily smoking were lower scholastic competence, lower behavioral conduct, lower self-worth, lower social acceptance, trying to lose weight ever and trying to lose weight now, higher drive for thinness, lower physical appearance, one parent in the house, higher stress, higher body dissatisfaction, and higher anxiety.

The combined (race included) multiple logistic regression model included the indicator variable for education (<3 years college compared to high school or less), one-parent household, drinking alcohol at ages 11–12, higher drive for thinness at ages 11–12, lower behavioral conduct at ages 11–12, stress at ages 10–11 and ages 12–13 and were significant predictors of daily smoking at ages 18–19. Inclusion of stress at two ages with opposite directions indicated that stress between ages 10–11 and 12–13 was significantly associated with the smoking outcome but in opposite directions. There were no significant interactions between race and any of the variables shown in Table 2.

We examined predictors separately for Black and White girls due to marked racial differences in proportions of daily smokers. The models predicting daily smoking for 18- to 19-year-old girls showed significant but different factors for Black and White girls when analyzed separately (Table 3). Factors independently associated with daily smoking in Black girls were drive for thinness and trying to lose weight now at ages 11–12. A Black girl was almost two and one-half times as likely to be a daily smoker at ages 18–19 if she reported that she was trying to lose weight at ages 11–12. Independent associations for White girls were one parent in the household and trying to lose weight now where a girl was almost twice as likely to be a daily smoker if there was only one parent in the household (OR = 1.78; $P = 0.012$) or she was trying to lose weight at ages 11–12 (OR = 1.51; $P = 0.034$). DFT was also significant (OR = 1.035; $P = 0.038$) when entered in absence of trying to lose weight now. Trying to lose weight now was chosen for the final model due to its higher odds ratio and lower P value. Lower behavioral conduct at ages 9–10 and 11–12 were also independently associated with daily smoking in White girls, where the odds of daily smoking increased by a factor of 0.65 (ages 9–10) and 0.53 (ages 11–12) for each unit decrease in behavioral conduct. Stress at both ages 10–11 and 12–13 was a significant predictor in the regression model with odds ratios in opposite directions. Daily smoking increased with increasing stress scores at ages 12–13.

DISCUSSION

Our findings of lower overall smoking and daily smoking among young adult Black girls than White girls is consistent with national data [*6*]. The high rates of overall and daily smoking among White girls is of great concern. This is the first study to our knowledge to report on multilevel independent risk factors for a large biracial cohort.

In both the unadjusted and the adjusted analyses many of the hypothesized independent factors varied by smoking status in the direction expected for both races. The common thread in predicting daily smoking between Black and White girls was their concern with weight. Unadjusted analyses showed that daily smokers compared to never smokers, regardless of race, had significantly higher scores on the DFT scale. In the combined multivariate model DFT was a significant predictor of daily smoking. When models were run separately by race, DFT was significant for Black girls and trying to lose weight now (ages 11–12) was significant for White girls. Drive for thinness was also significant for White girls when entered into the multivariate model without the other weight-related variables. This has not been reported previously in Black girls and might indicate that more girls smoke as their desire to be thinner increases. Two previous studies found that adolescents who are concerned with dieting are more at risk for cigarette use [*15,17*]. Another study found that the single best predictor of regular smoking was the use of cigarettes as a weight control strategy [*18*]. We did not, however, ask whether cigarette smoking was used for weight loss. Our study is unique in that we had both a general and a more specific measure for dieting and concern for thinness and both were found to be significant independent predictors. Notably, in a previous analysis BMI and DFT were strongly related for Black and White girls (DFT increased with increasing BMI) [*28*], which may account for the absence of percentage overweight as a predictor of daily smoking.

Consistent with previous research, parental education was highly predictive of smoking behavior in White girls, with the same trend in Blacks. In multivariate analyses, parental education (4 years or more of college compared to high school or less) was protective against daily smoking when race was included in the model. When analyses were conducted separately by race, the parental education variable was no longer significant. The coefficients for education were similar;

TABLE 1

Unadjusted[a] Comparison of Daily Smokers with Never Smokers at Ages 18–19 in NGHS Girls

Variable	Black			White		
	Daily smokers (N = 72)	Never smokers (N = 862)	P value (t test[1] or chi-square[2])	Daily smokers (N = 229)	Never smokers (N = 518)	P value (t test[1] or chi-square[2])
Parent education (%)						
≤HS grad	38.9	28.1		27.5	17.9	
≤3 yr college	47.2	49.0	0.08[2]	34.9	31.5	0.001[2]
≥4 yr college	13.9	22.9		37.5	50.6	
Behavioral/personal factors						
Alcohol use (% yes)						
Ages 9–10	14.3	8.2	0.10[2]	7.3	4.3	0.11[2]
Ages 11–12	4.4	4.2	0.92[2]	3.8	3.1	0.63[2]
Scholastic competence (mean; SD)						
Ages 9–10	2.8 (0.67)	2.9 (0.67)	0.2153[1]	2.9 (0.65)	3.0 (0.67)	<0.001[1]
Ages 11–12	2.8 (0.63)	3.0 (0.66)	<0.05[1]	2.8 (0.64)	3.0 (0.65)	<0.001[1]
Behavioral conduct (mean; SD)						
Ages 9–10	3.0 (0.70)	3.0 (0.64)	0.66[1]	3.0 (0.59)	3.2 (0.55)	<0.0001[1]
Ages 11–12	2.9 (0.68)	3.0 (0.63)	0.34[1]	2.9 (0.64)	3.2 (0.57)	<0.0001[1]
Self-worth (mean; SD)						
Ages 9–10	3.1 (0.59)	3.2 (0.64)	0.39[1]	3.0 (0.62)	3.2 (0.59)	<0.0001[1]
Ages 11–12	3.0 (0.66)	3.2 (0.61)	0.02[1]	3.0 (0.62)	3.2 (0.58)	<0.001[1]
Social acceptance (mean; SD)						
Ages 9–10	2.8 (0.72)	2.9 (0.66)	0.11[1]	2.9 (0.69)	2.9 (0.70)	0.98[1]
Ages 11–12	3.0 (0.66)	3.2 (0.64)	<0.02[1]	3.0 (0.64)	3.0 (0.66)	0.39[1]
Anxiety (mean; SD)						
Ages 11–12	13.2 (6.1)	10.9 (6.2)	<0.004[1]	11.8 (6.5)	10.5 (6.5)	<0.02
Stress (mean; SD)						
Ages 10–11	25.8 (7.3)	24.9 (6.6)	0.26[1]	25.0 (7.4)	25.1 (7.4)	0.85[1]
Ages 12–13	24.9 (7.7)	23.8 (6.8)	0.23[1]	26.0 (7.5)	23.6 (7.2)	<0.0001[1]
Athletic competence (mean; SD)						
Ages 9–10	2.6 (0.61)	2.7 (0.68)	0.16[1]	2.8 (0.69)	2.7 (0.70)	0.46[1]
Ages 11–12	2.8 (0.70)	2.8 (0.69)	0.70[1]	2.8 (0.70)	2.7 (0.70)	0.50[1]
Physically active (%)						
Ages 9–10						
Never/almost never	14.5	15.5		9.5	8.6	
Sometimes	50.7	42.2	0.37[1]	37.3	41.2	0.59[1]
Usually/always	34.8	42.3		53.2	50.2	
Ages 13–14						
Never/almost never	7.3	10.1		5.3	4.4	
Sometimes	47.1	48.0	0.68[1]	36.5	37.1	0.88[1]
Usually/always	45.6	41.8		58.2	58.5	
Weight/developmental						
Overweight[b] (%)						
Ages 9–10	37.5	29.9	0.18[2]	23.9	19.6	0.19[2]
Ages 11–12	38.2	34.8	0.57[2]	24.9	21.0	0.26[2]
Trying to lose weight now (% yes)						
Ages 9–10	41.7	42.8	0.84[2]	42.3	32.3	<0.01[2]
Ages 11–12	29.0	33.7	0.42[2]	42.9	28.2	<0.001[2]
Ever tried to lose weight (% yes)						
Ages 9–10	62.5	55.5	0.25[2]	60.1	47.7	<0.002[2]
Ages 11–12	35.3	36.3	0.86[2]	50.9	36.4	<0.001[2]
Body dissatisfaction (mean; SD)						
Ages 11–12	7.5 (6.0)	6.2 (7.0)	0.11[1]	7.7 (7.9)	6.0 (6.9)	<0.009[1]
Drive for thinness (mean; SD)						
Ages 11–12	6.0 (6.0)	4.3 (4.9)	<0.006[1]	5.5 (5.8)	3.7 (5.3)	<0.0001[1]
Physical appearance (mean; SD)						
Ages 9–10	2.9 (0.71)	3.0 (0.70)	0.25[1]	2.7 (0.74)	2.9 (0.73)	<0.004[1]
Ages 11–12	2.8 (0.80)	2.9 (0.75)	0.16[1]	2.5 (0.75)	2.7 (0.76)	<0.004[1]
Early menarche[c] (% yes)						
Ages 9–10	28.2	20.4	0.14[2]	20.7	17.1	0.25[2]
Ages 11–12	27.9	19.9	0.13[2]	19.9	16.4	0.28[2]
Family/social environment						
Family cohesion (mean; SD)						
Ages 9–10	27.1 (5.2)	27.1 (5.0)	0.95[1]	26.5 (4.9)	27.0 (4.4)	0.24[1]
Ages 11–12	25.7 (6.0)	25.4 (5.1)	0.72[1]	24.7 (6.0)	25.4 (5.4)	0.09[1]
One parent in house (% yes)						
Ages 9–10	54.2	41.3	<0.04[2]	25.3	16.4	<0.005[2]

[a] Likelihood ratio chi-square probability.

[b] Overweight based on BMI ≥ age-specific 85th percentile for girls (NHANES II) DHHS Publication No. (PHS)87-1688.

[c] Early menarche based on race-specific quintiles.

TABLE 2

Childhood and Adolescent Predictors of Daily Smoking at Ages 18–19 in Black and White Girls in NGHS: Multiple Logistic Regression Results

Variable	Odds ratio	95% Confidence interval	*P* value
Race (Black)	0.13	0.09, 0.19	<0.0001
Parent education (≥4 years college)[a]	0.59	0.39, 0.88	0.06
Parent education (≤3 years college)[a]	0.70	0.48, 1.02	0.02
One parent in house at ages 9–10	1.54	1.08, 2.21	0.01
Drinking alcohol at ages 11–12[b]	2.24	1.31, 3.83	0.003
Drive for thinness at ages 11–12[b]	1.05	1.02, 1.08	0.0004
Behavioral conduct at ages 11–12[b]	0.60	0.47, 0.77	<0.0001
Stress at ages 10–11[b]	0.97	0.95, 0.99	0.02
Stress at ages 12–13[b]	1.03	1.01, 1.06	0.009

Note. Hosmer–Lemeshow goodness-of-fit test *P* value = 0.34.
[a] Indicator variables for education. Reference is high school or less.
[b] Odds ratios are for one unit increase in scale.

however, splitting the sample size in half resulted in a loss of statistical significance. Similarly, alcohol use at ages 11–12 was higher in daily smokers compared to never smokers and was an independent predictor in the combined multivariate analysis. However, in the race-specific analysis alcohol was not important.

One parent in the household was an independent predictor for White girls, consistent with the 1994 Surgeon General's report, which indicated an association between adolescent smoking acquisition and living in a single-parent home in non-ethnic-specific populations. One parent in the household is also highly related to household income and parental education and may actually be a proxy for SES.

Perception of scholastic competence was higher in never smokers compared to daily smokers but was not significant in multivariate analyses. The unadjusted finding is consistent with a review [*11*] that found 80% of the prospective studies on smoking onset show a positive relationship between low academic achievement and smoking onset. In unadjusted analyses behavioral conduct was lower in White daily versus never smokers but not in Blacks. Combined multivariate results show behavioral conduct as a significant predictor; however, in race-specific analyses, lower behavioral conduct (ages 11–12) was a predictor only for White girls. Both unadjusted and multivariate analyses show similar trends for behavioral conduct. In the combined multivariate analyses the odds ratios for stress scores at the earlier and later time periods were in different directions, with the relationship holding only in White girls in the race-specific analyses. Stress effects for both time periods were among the weakest of all other variables and one cannot rule out a possible Type I error; however, it is unlikely that a younger girl copes with stress in the same way as an older girl. This difference might be the result of changes in coping. Girls under stress at earlier age might find strategies to deal with stress other than smoking. Additionally, cigarettes are more likely to be available [*28*] and they have more functional social meaning to older girls [*29*]. Older girls may also use tobacco to self-medicate for stress and depression [*30*]. Cigarette use can be viewed as a coping mechanism [*31,32*] to deal with family disruptions or other significant stressors in their lives. Smoking may also serve important mood regulation functions, by inducing a subjective sense of relaxation or self-control [*33*].

Predicting daily smoking in girls at ages 18–19 from early behavioral, environmental, and body weight-related domains is a complex process and many of the factors we now suspect are important predictors of adolescent smoking (social/cultural/environmental) were not considered 10 years ago. We may not have the power to detect significant interactions between Blacks and Whites due to the substantial differences in daily smoking. The significance level (0.05) chosen may be considered liberal; however, considering the exploratory nature of this analyses, we did not want to overlook possible relationships. Our race-specific regression models fit reasonably well (Hosmer–Lemeshow Goodness-of-Fit test $P = 0.57$ Black; $P = 0.89$ White). The absence of biochemical validation of age 18–19 smoking status may be considered a weakness of our study. Evidence from a recent meta-analysis of studies using self-reports and biochemical validation assessments of smoking status supports the accuracy of most

TABLE 3

Childhood and Adolescent Predictors of Daily Smoking at Ages 18–19 by Race: Multiple Logistic Regression Results

Variable	Odds ratio	95% Confidence interval	*P* value
Black girls			
Drive for thinness at ages 11–12[a]	1.11	1.05, 1.17	<0.0002
Trying to lose weight now at ages 11–12	2.39	1.25, 4.75	<0.02
White girls			
One parent in house at ages 9–10	1.78	1.13, 2.81	0.012
Behavioral conduct at ages 9–10[a]	0.65	0.46, 0.91	0.013
Behavioral conduct at ages 11–12[a]	0.55	0.40, 0.76	0.0003
Stress at ages 10–11[a]	0.96	0.93, 0.98	0.002
Stress at ages 12–13[a]	1.03	1.01, 1.06	0.015
Trying to lose weight now at ages 11–12	1.51	1.03, 2.21	0.034

Note. Hosmer–Lemeshow goodness-of-fit $P = 0.892$.
[a] Odds ratio for one unit increase in scale.

self-reports in adolescents [*34–36*]. We may also have enhanced the validity of self-reported smoking status in this study, as there were other biologically oriented measures taken during NGHS yearly visits including blood testing for lipids and glucose. Girls may have acted as in the "bogus pipeline" method [*37*] and presumed their answers regarding their smoking status would be compared to laboratory data.

It appears important to stress effective, healthy *weight control methods* and *stress coping skills* for young adolescent girls. The high prevalence of smoking, particularly for the White girls, clearly points to the need for cessation programs and resources for young women at various levels: medical care, home, elementary and middle school, college and community level. The higher rate of experimental and occasional use in young Black women is also of concern and we may see these groups progress to daily smoking in future years. Additionally, future work should add to our knowledge by investigating other social, environmental, and cultural factors and determining their contributions to adolescent smoking at multiple levels.

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